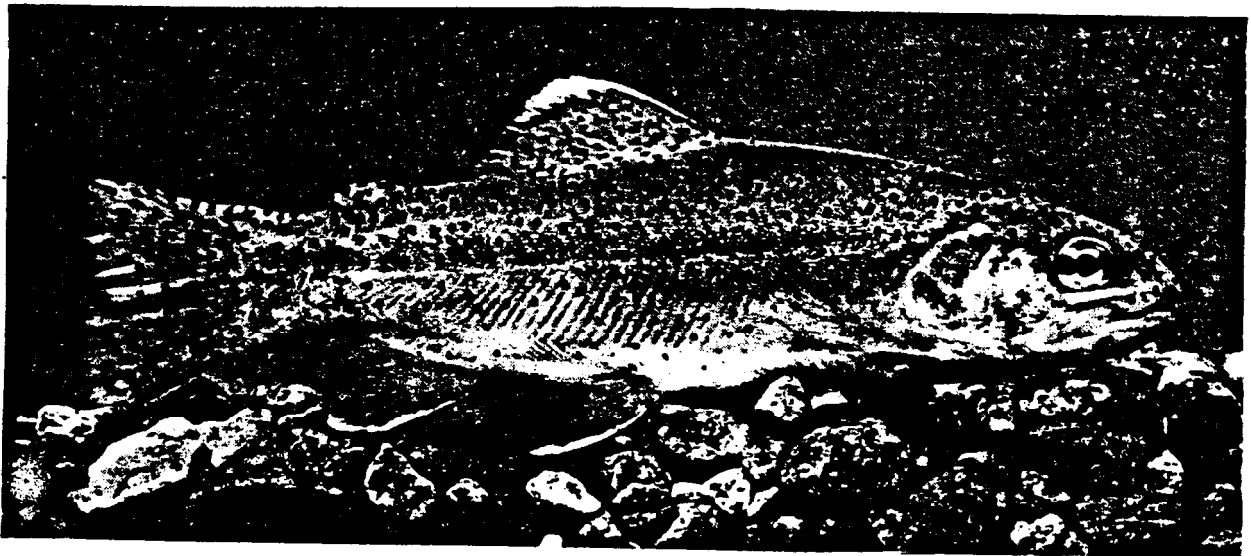


# **ARIZONA TROUT**

**(APACHE TROUT)**

## **RECOVERY PLAN**



**U.S. Fish and Wildlife Service**

**Albuquerque , New Mexico**

**1983**

RECOVERY PLAN

FOB

ARIZONA TROUT, Salmo apache, Miller, 1972

PREPARED BY

THE ARIZONA TROUT RECOVERY TEAM

March 1, 1979

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## ARIZONA (APACHE) TROUT RECOVERY PLAN SUMMARY

Arizona trout were recognized as a unique species many years before they were officially described in 1972. Their distribution is centered in the White Mountains of east Central Arizona, on lands administered by the White Mountain Apache Tribe and adjacent Apache-Sitgreavee National Forest. The principle reason for the decline of this native trout is loss of habitat and genetic swamping by introduced rainbow trout.

Recovery efforts center around 1) developing good methods of identifying pure populations of Arizona trout, 2) protecting those populations and their habitats, 3) reintroducing Arizona trout into historic waters after the nonnative species have been eliminated, and 4) developing and implementing land management plans for the protection of Arizona trout habitats.

This revised Arizona Trout Recovery Plan incorporates the original plan signed in 1979. It incorporates new data, including restoration work on several streams on Indian and Forest Service lands and preliminary research on determining Arizona trout purity. The common name Arizona trout was originally used to describe Salmo apache, but the newest American Fisheries Society publication of Common and Scientific Names of Fishes (Robins, et al. 1980) uses Apache trout. This change has not been utilized in this publication, but will be made in future revisions.

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## PREFACE

The Arizona Trout Recovery Plan has been developed by the Arizona Trout Recovery Team to coordinate recovery efforts for this threatened species. The basis of **this Plan is** the belief that private, **state** and Federal agencies charged with land and species management within the historic range of the Arizona trout are interested **in** its preservation and recovery. Using this basis, the Team **has** made **recommendations** on the **management of the species** and **its habitat** that take into **consideration** the **biological** needs of **the species**. If the **recommendations** are followed, it is hoped that pure **populations** of **Arizona** trout will again occupy **many** of the **streams** in the **White Mountains** of **Arizona**.

Moat land managers involved in the recovery **actions** of **Arizona** trout have reviewed drafts **of** this Plan and a **few** have expressed concern over **the economic** effects of **its implementation**. It should be remembered that Arizona trout have a **strong** recreational potential that **is** now only partially being utilized. Recovery of the **species** will be followed by delisting and its **greater** availability to recreational angling. This increased recreational revenue should do **much** to offset any actions needed to protect **Arizona** trout **habitat**.

**This is the completed Arizona Trout Recovery Plan. It has been approved** by the **U. S.** Fish and Wildlife Service. **It does not necessarily represent official positions or approval of cooperating agencies and it does not necessarily represent the views of all recovery team members, who played a key role in preparing this Plan. This Plan is subject to modification as dictated by new findings and change in species status and completion of tasks assigned in the Plan.**

Literature citations should read **as follows**:

U.S. Fish and Wildlife Service. **1983. Arizona** Trout Recovery Team, Albuquerque, New Mexico.

Additional copies may be obtained **from either**:

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#### ACKNOWLEDGEMENTS

The **Team** wishes to express its appreciation to **Dr. Robert Behnke**, Colorado State University, for **permission** to utilize **portions** of **his** 1976 status report of **Salmo apache** in the **Phase I** effort of this Plan. **His** cooperation helped **greatly to expedite drafting of this Recovery Plan.**

We also wish to express our appreciation to Mountain Apache Recreation Enterprise, John **Rinne** (TJSFS), **R. Miller** (**University** of Michigan) and **W. L. Minckley** (**Arizona** State University). These gentlemen **participated** in the formation of **this draft** and contributed **significantly** to the accomplishment of our **assigned** task.

The **White** Mountain Apache Tribe **has** done much to perpetuate this species. Their assistance in this undertaking is gratefully acknowledged.

## PART I - INTROUCTION

Order	--	<b>Salmoniformes</b>
Family	--	Salmonidae
Genus	--	<b>Salmo</b>
Species	--	<u>Salmo apache</u>

### I. Taxonomy

A. Distinguishing characteristics: Body deep and compressed; dorsal fin large; spots on body pronounced and often **uniformly** spaced, roundish in outline, medium-sized; spots slightly smaller than in moat interior • ♦ ♣ □ ⊕ ⊗ ⊞ ⊠ of cutthroat, Salmo clarki, but **more** like typical cutthroat trout than the Gila trout, Salmo gilae. Yellowish or yellow-olive ground colors **predominate**, with tints of purple and pink **observable** on fresh specimens, but no red or pink lateral bend present. Dorsal, pelvic and anal fins with **conspicuous cream or yellowish** tip. Yellow cutthroat mark present. Vertebrae 58-61; pyloric caeca 21-41: acalea 133-172 (range of **mean 146-158**) in lateral series and 32-40 (range of **means 34-36**) above lateral line. Diploid chromosomes number 56 with 106 arms. Effects of hybridization with rainbow trout, Salmo gairdneri can be detected (or auaped) on the basis of the following characteriatica: **man value** of vertebrae counts **more than 60**, **mean scale** counts lame **than 150** in lateral series and **less than 34** above lateral line. **Mean pyloric caecal** valuer of **more than 32**, end erratic spotting or coloration (2).

B. Validity: Although native trout were known from the White Mountains, Arizona, mince 1873, they were not described as a distinct species until 1972 (9). Cope and Yarroy (5) described their specimens collected from the White River u a variety of "Salmo pleuriticua," the Colorado River cutthroat trout. Jordan and Evermann (7) referred to specimens from the headwatera of the Little Colorado giver as "Salmo mykiss pleuriticua." Miller (8) and moat subsequent authors (3, 4, 10) tentatively referred to the native trout of the White Mountains as Salmo gilae. Miller (9) described Salmo apache, with an original diatribution in the upper Salt River (Black sad White rivers), San Francisco River (Blue River) and the headwaters of the Little Colorado River, Arizona. Trout native to Oak Creek of the Verde River drainage had the general appearance and spotting pattern typical of Gila trout, and Miller (9) identified them. am S. gilae. Additional samples of trout fra Sycamore Creek (Agua Fria drainage) were tentatively identified as hybrids by Behnke, Minckley, • ud Miller, supporting Miller's conclusion (2).

Comprehensive information on the genetic purity of geographically isolated populatioua of Arizona trout is generally lacking. The problem la twofold: First, it involves interspecific interaction

resulting in hybridization with the introduced S. gairdneri; further, unique sub-populations (races) of **Arizona trout** may exist as a result of isolation in disjunct watersheds or drainage systems. The genetic purity on both a specific and racial level is of considerable scientific value and both levels are discussed in the plan. Therefore, although the terms "Arizona trout" or "Salmo apache population" are used interchangeably throughout the plan to cover both levels of genetic purity, it is done for the sake of discussion and not in ignorance of the problem.

## II. Life History and Ecology

- A. Relative Abundance: The headwaters of the White and Black river drainages on the Fort Apache Indian Reservation contain the largest concentrations of Arizona trout. **Larger streams (Bonita Creek, East Fork White River)** may carry several thousand Arizona trout. **Poor winter** populations of S. apache in small tributary streams may be less than 100 individuals, while autumn numbers are usually 4 to 5 times higher. Intermittent tributaries have few or no year-long residents, but may serve as spawning and nursery areas depending upon climatic conditions.
- B. Habitat Description: Published information concerning habitat requirements of Salmo apache is limited. Therefore, considerable information presented herein has been inferred from studies of other salmonids. Introduction of exotic salmonids (Salmo gairdneri, S. trutta, and Salvelinus fontinalis) has reduced Arizona trout populations to those existing mainly in headwater areas upstream from natural barriers. The environment downstream from headwater springs is often harsh during winter, with formation of anchor ice and ice bridges. Harper (6) reported these streams are subject to extremes of low and diurnal temperatures. The stream he examined had low-pool-riffle sections, widths greatly exceeding depths, with the majority of the reach consisting of riffles and runs.
- C. Food and Feeding: Harper (6) found that feeding habits of S. apache in Big Bonita Creek on the Fort Apache Indian Reservation depended upon fish size. Fish 6 - 9 cm long primarily fed on Ephemeroptera, whereas fish 15 cm and larger utilized more Trichoptera. Terrestrial insects were eaten by all size classes. Utilization of Diptera, Trichoptera, and terrestrial insects changed with the seasons. Fish 12.4 - 4-20.6 cm long were captured from Mamie Creek on the Apache-Sitgreaves National Forest exhibited similar feeding tendencies; however, ephemeropterans were more prevalent in the diet of larger specimens than those examined by Harper (unpublished data, Arizona Game and Fish Department).



- D. **Reproduction:** Few studies have been conducted on Arizona trout reproduction. Spawning is known to occur from March through mid-June and varies with stream elevation. Harper (6) found redd constructions commenced as water temperatures reached 8°C. Due to the abundance of hybrid populations, it has been theorized that the spawning period of Arizona trout is essentially identical to that of rainbow trout, S. gairdneri. However, Miller (9) and Aandersen (1) suggested that hybridization may occur primarily during a marginal overlapping of the spawning periods.

Harper (6) recorded fecundity in fish 13.1 - 19.1 cm long from Big Bonita Creek ranging from 72 - 238 eggs. Roselund (11) found that egg numbers varied from 6461,083 from Christmas Tree Lake specimens 29.84 - 34.92 cm in length. Fish collected from Ord Creek in 1962 and held by the Arizona Game and Fish Department, yielded an average of 72 eggs per female in 1964. During 1969, the same brood stock produced an average of 4,215 eggs per female. In examining Bonita Creek specimens, Harper (6) found the smallest mature female to be 13.0 cm long, while the smallest mature male was 14.5 cm long. These sizes corresponded to a spawning age of 3 years. Two redds examined by Harper during his study contained 43 and 67 eggs. Since the fecundity of all fish checked was greater than this, he suggested that each of Salmo apache may deposit eggs in several redds during a single spawning season. Redds were constructed primarily at the downstream end of pools in a wide variety of substrates, water velocities, and water depths. The period from egg deposition to emergence of fry in Big Bonita Creek above 2500 meters elevation, he found fish larger than 17.0 cm T.L., and 21.0 cm T.L., comprised approximately 21 percent and 5 percent respectively of each population. The present world angling record for this species is 36 cm T.L. and weighed 1.64 kg. This record fish was taken from Bear Canyon Lake in 1973.

- F. **Competition and Predation:** Competitive interaction with introduced species has been the major cause of the S. apache decline. Introduced salmonids exhibit tendencies to outcompete Arizona trout for food and space and to prey upon them. In addition to the above, rainbow and cutthroat trout contaminate the Arizona trout gene pool through hybridization.

### III. Historic Distribution

The former distribution of Salmo apache is still somewhat confused with that of Salmo gilae. Salmo apache occupied the headwaters of the Little Colorado, Salt, and San Francisco rivers (Figure 1). Specimens collected by F. W. Chamberlain in 1904 from K. P. Creek, tributary of Blue River (San Francisco River drainage) exhibited spotting patterns of S. apache but showed hybrid influence (9). However, in Chamberlain's notes these fish were reported to have a

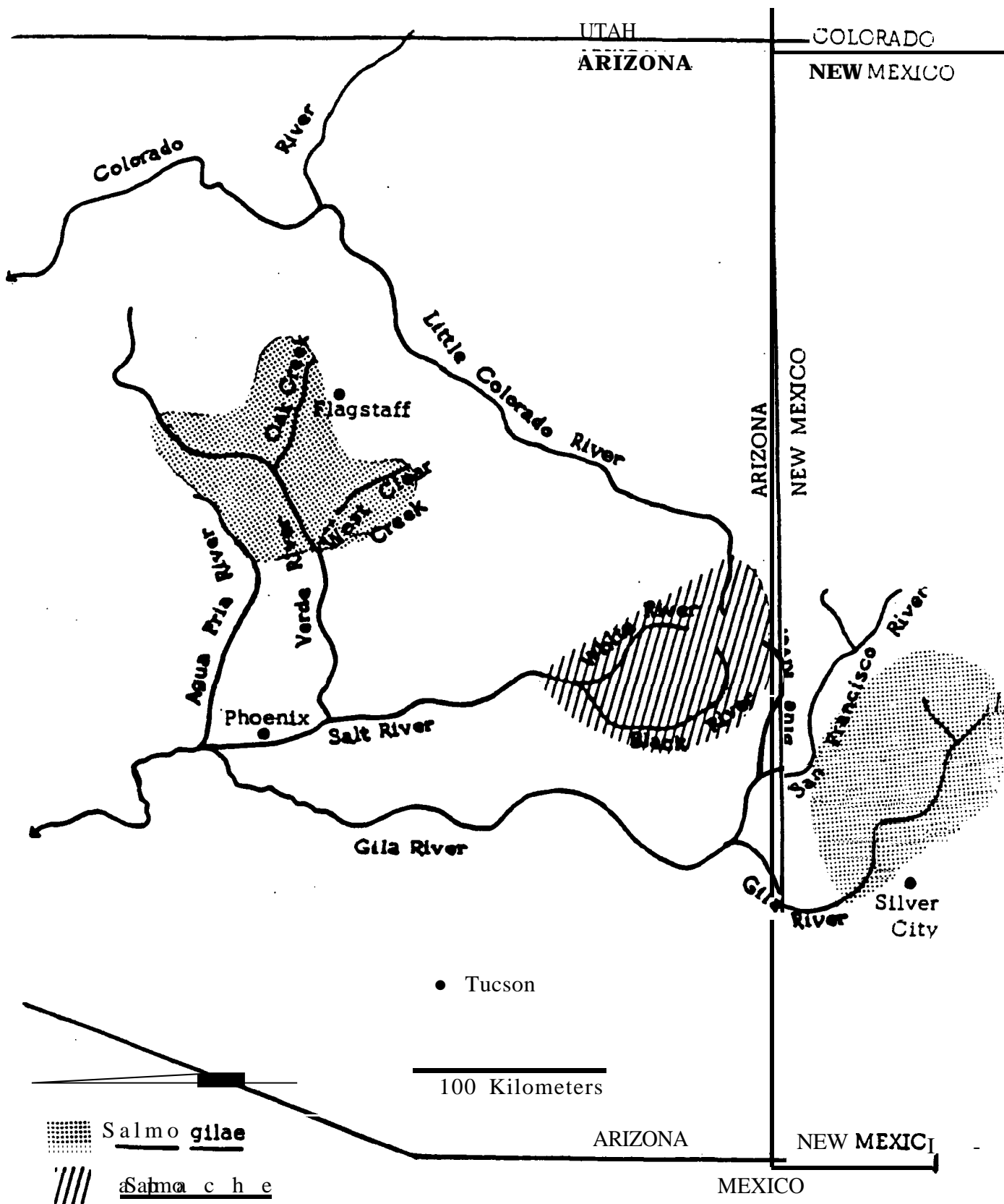
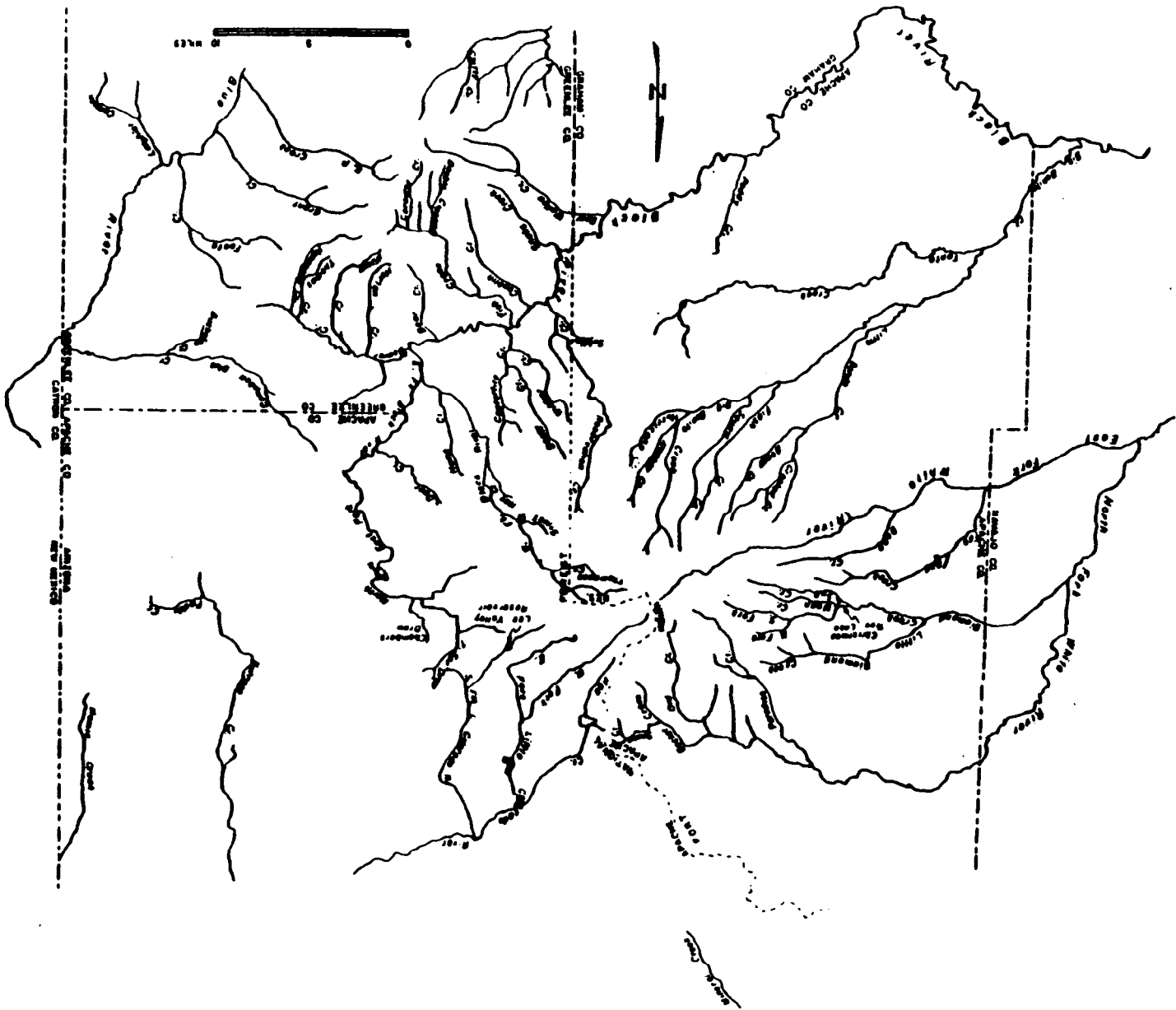


Figure 1. Indigenous distribution of Salmo gilae and Salmo apache. Adapted from Behnke and Zarn, 1976.

FIGURE 2. Drainage Map of the White Mountains, Arizona



distinct red band which is characteristic of S. gilae. Specimens collected in 1913 from Oak Creek (Verde River drainage) were identified as hybrid S. These x S. gairdneri by Miller (9) and exhibited morphological characteristics of S. apache but spotting patterns of S. gilae, suggesting a possible intergrade of two species. Therefore, at the geographical extremes of the historic salmonid range in Arizona, specimens have been collected which exhibit characteristics of both species.

If the distribution pattern holds true to drainage, the K. P. Creek specimens (Blue River drainage) should have been S. apache. Other specimens of native trout collected from the Gila drainage have been identified as coming from S. gilae. Stockinck include a recent collection (1973) from Chitty Creek (Figure 2), tributary to Eagle Creek, tentatively identified by W. L. Mackley and R. R. Miller as hybrid S. Kynard x S. gairdneri. This suggests that with this identification and suggested the Chitty Creek population is a subspecies of Salmo apache. Field surveys currently underway in the Blue, Little Colorado and Black River drainages may help to further our knowledge of the historic distribution of these two native trout species. The former widespread distribution of S. apache in the Black, White, and Little Colorado drainages is confirmed by present hybrid population and documented collections. Many early White Mountain area settlers reported the presence of native trout which they referred to as 'yellow-bellied, speckled trout' (Figure 3).

#### xv. Present Known Distribution

The present range of genetically pure S. apache populations is now confined to approximately 48 km (30 mi.) or less of small streams, reduced from an estimated original range of approximately 965 km (600 mi.) (6).

Current survey records (13, and others) indicate natural populations of pure Salmo apache still remain in a few streams on the Fort Apache Indian Reservation and Apache-Sitgreaves National Forest as follows:

**Boggy Creek** (Reservation)  
**Crooked Creek** (Reservation)  
 South Fork **Diamond Creek** (Reservation)  
 East Fork **White River** (Reservation)  
**Centerfire Creek** (Apache-Sitgreaves NF)  
**Soldier Creek** (Apache-Sitgreaves NF)

Natural populations of S. apache trout that fit most of the criteria for purity include:

**Firebox Creek** (Reservation)  
**Little Diamond Creek** (Reservation)

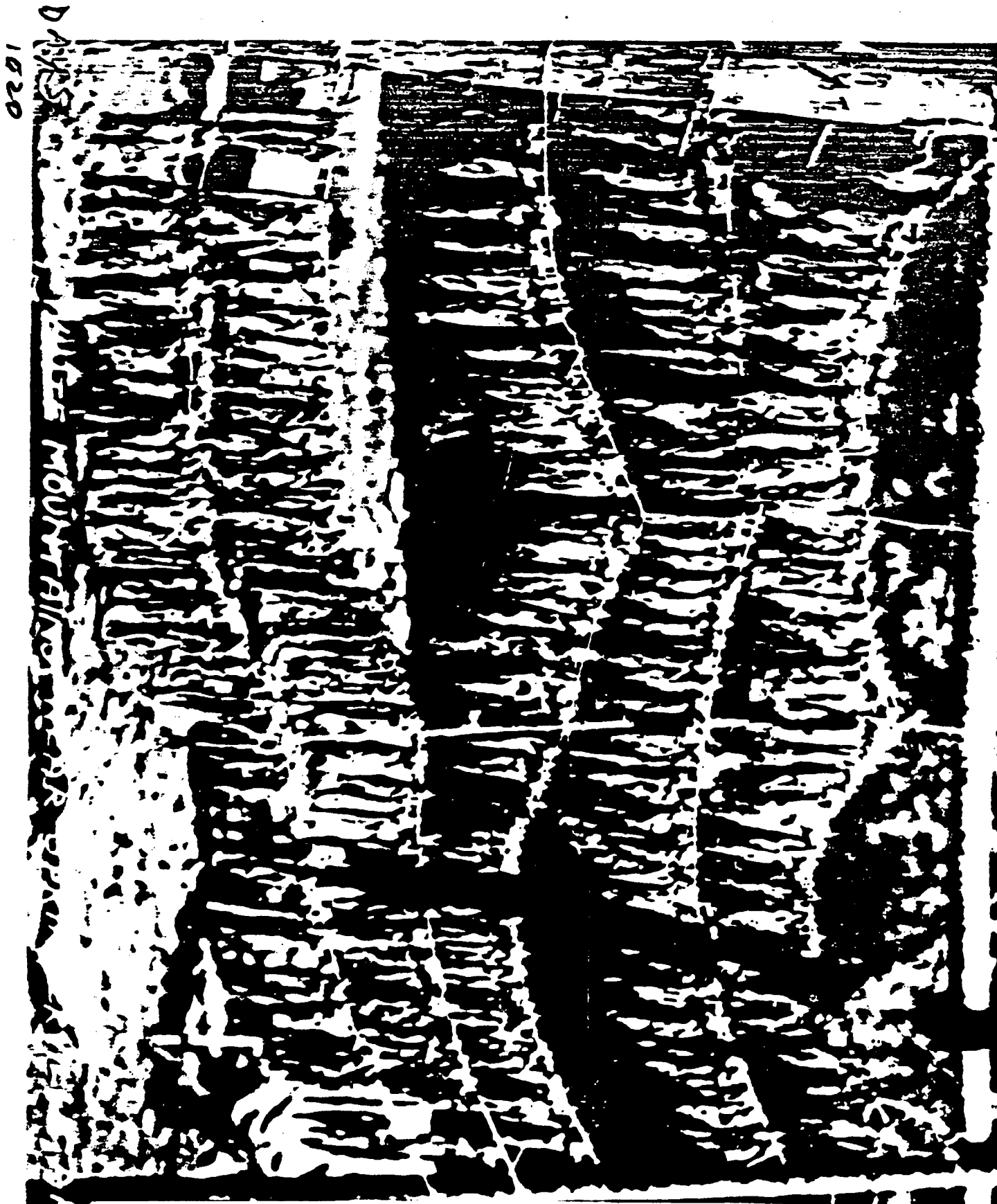


Figure 3. "Days catch, White Mountains near Springerville, Arizona."  
Date: pre 1900's. Probably from Becker Creek.

Big Bonlta Cleaega (Reservation)  
Little **Bonita** Creek (Reservation)  
Flash Creek (Reservation)  
Paddy Creek (Reservation)  
Boggy Creek (Apache-Sitgreavee **NF**)  
Stinky Creek (Apache-Sitgreaves **NF**)

Natural populations of Arizona trout that have obviously been hybridized with other **salmonid** species include:

Deep Creek (**Reservation**)  
North Fork Diamond Creek (Reservation)  
Paradise Creek (Reservation)

Introduction efforts over the past few years have spread Arizona trout into additional White Mountain waters **as** well as streams and lakes on **Mount Graham (Pinaleno Mountains, Coronado NF) and the Kaibab Plateau (Kaibab NF)** (Table 1). The non-historic Introductloa sites were chosen because they lacked any **native salmonids**, and have provided the general public a chance to fish for this threatened native trout. Further introductions of **S. apache** should **be limited** to **historic waters** and those non-historic waters in which the species has already been introduced.

In addition to the **known** populations **listed above**, other heedwaters **and remote streams** throughout the White Mountain area **may** contain additional Arizona trout **populations**. Further surveys are needed to confirm the total **distribution** of this species and its genetic purity in **some** of the above localities. Many streams in the **White Mountain** area support trout populations which display both **Arizona** and **rainbow** trout **characteristics**. The presence of these hybrids suggests that **additional—and as yet unknown—isolated** headwater areas may contain pure **S. apache** populations.

v. **Land Ownership**

All of the **known sites** supporting native or introduced populations of **S. apache** are found on national forests or the Fort Apache Indian Reservation.

VI. **Conservation Efforts**

Conservation of Arizona trout **vaa** first undertaken by the White Mountain Apache Tribe in the late 1940's and **1950's. At that time**, the only known **populations** of this **apeciea existed on the** Fort Apache Indian Reservation and the Tribe **was** concerned **with** their preservation. **On March 24, 1955**, the **Tribe** closed sport fishing for the species on all **Mount Baldy streams** that still contained **what was** believed to be pure **populationa** of 'Apache trout.\* Subsequently, **other streams** were added to those specified in the **original** reaolutloa and were **also** closed to

Table 1. Streams Into Which Salmo apache Have Been Introduced.

STREAMS	YEARS INTRODUCED	POPULATION PRESENT	QUESTIONABLE		
			PURE	PURITY	IMPURE
North Canyon ( <b>Kaibab NF</b> )	1963, 68	Y e a	<b>X</b>		
<b>Mami</b> Creek (A-S <b>NF</b> )	1965, 67, 68	Yea		<b>X</b>	
Grant Creek System (Coronado <b>NF</b> )	1965, 68, 69	Yea	<b>X</b>		
Ash Creek (Coronado <b>NF</b> )	1965, 68,	Yea			
Mineral Creek (A-S <b>NF</b> )	1967, 68	Y U		<b>X</b>	
<b>Marijilida</b> Creek (Coronado <b>NF</b> )	1968, 69	No			
<b>Deadman</b> Creek ( <b>Coronado NF</b> )	1968, 69, 70	No			
Grant Creek (A-S <b>NF</b> )	1969	Y u			
<b>Horton</b> Creek ( <b>Tonto NF</b> )	1971	No			
San Creek ( <b>Reservation</b> )	1969, 70, 71, 72	Y U	<b>X</b>		
<b>Moon</b> Creek ( <b>Reservation</b> )	1969, 70, 71, 72	Yea	<b>X</b>		
Lee Valley Creek (A-S <b>NF</b> )	1977	No			
Ord Creek ( <b>Reservation</b> )	1980, 81	Yea	<b>X</b>		
<b>Hurricane</b> Creak (Reservation)	1981 -	Yea	<b>X</b>		
<b>Bear</b> Wallow Creek (A-S <b>NF</b> )	1981	Yea	<b>X</b>		
Coleman Creek (A-S <b>NF</b> )	1981	Yea	<b>X</b>		
Lee Valley Creek (A-S <b>NF</b> )	1982	Yea	<b>X</b>		

angling. Interest in the species continued and substantially increased during the early 1960's, resulting in fishery surveys carried out by the U.S. Fish and Wildlife Service and the Arizona Game and Fish Department in cooperation with the White Mountain Apache Tribe to determine the exact **status** of the fish. In conjunction with these surveys, the Arizona Game and Fish Department, again in cooperation with the Tribe and Fish and Wildlife Service, entered into a **hatchery** propagation program. Pure strain Salmo apache were collected from Ord Creek, on the Fort Apache Indian Reservation in 1962, and successfully propagated at the Department's Sterling Springs **Hatchery** near Flagstaff. Resulting progeny were introduced into Christmas Tree, Bear Canyon, Becker and Lee Valley lakes and prepared **streams** on the Apache-Sitgreaves Kalbar, **Tonto** and Coronado National **Forests**. The stocking continued from 1965 through 1974. The Arizona native trout was recommended for inclusion in the Secretary of the Interior's list of rare and endangered species in 1964 and officially listed as endangered by I.U.C.N. (Red Data **Book, IV-Pices**) in 1969.

In a Tribal resolution dated November 10, 1964, the White Mountain Apache Tribe adopted a management plan proposed by the U.S. Fish and Wildlife **Service**. This plan called for the reclamation of **streams** and the construction of fish barriers and lakes for the reintroduction of the **Arizona** trout. As part of this plan, the **Tribe reclaimed** Sun and Moon creeks and constructed an impoundment (**Christmas Tree Lake**) at their confluence to help preserve this **native** fish. In 1965 the tribe, by resolution, closed Ord Creek, the upper reaches of East Fork of White **River**, Paradise Creek and their tributaries to fishing. Christmas Tree Lake filled in the early spring of 1967. Reintroduction of the Arizona trout were made from Ord, Flerebox, and Deep creeks. In addition, fry from the Ord Creek brood stock being held at Sterling Springs Hatchery were introduced at this time. For their preservation efforts, the White **Mountain Apache** Tribe received the United States Department of the **Interior Conservation** Service Award (1969).

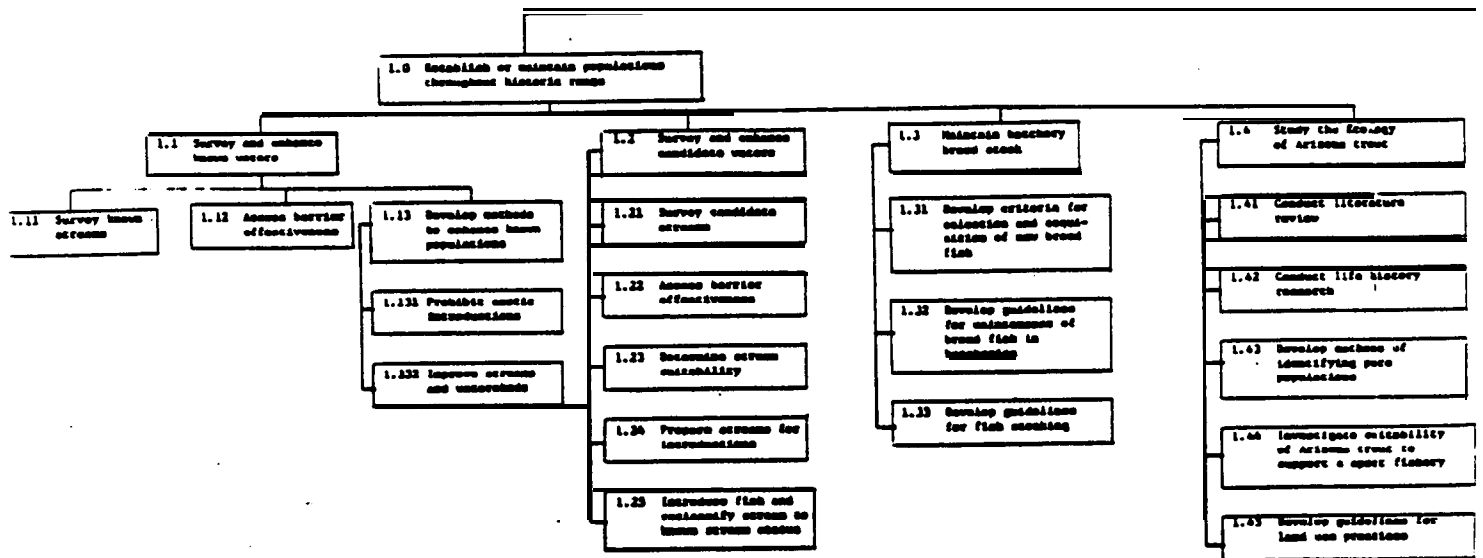
The **Endangered Species Act (P.L. 93-205)** was passed by Congress in 1973 and the **Arizona** trout was brought under its protection. Public and Tribal waters were closed to the taking of Arizona trout in 1974. A recovery team was formed in 1975 and during that year the Arizona trout was one of the first endangered species to be **downlisted** to threatened status. Public waters were reopened to fishing for this species at that time, but waters on the Fort Apache **Indian** Reservation remained closed for taking S. apache.

#### VII. Population Limiting Factors

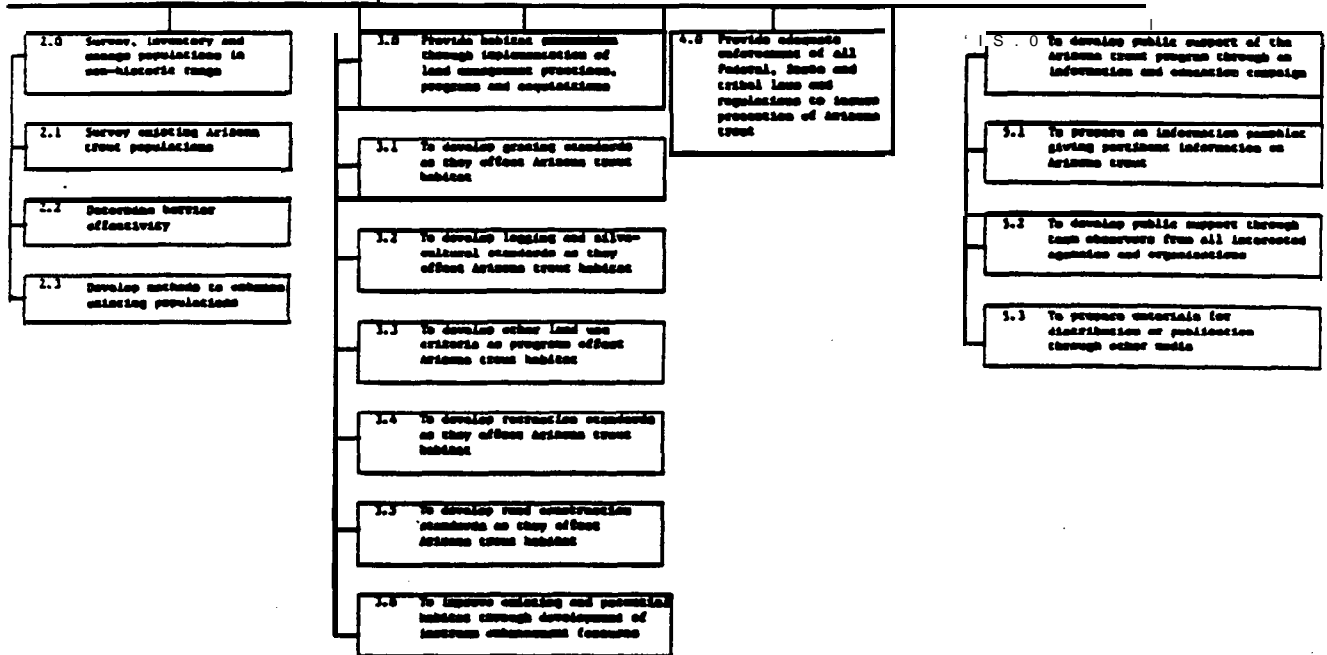
**Historically**, the **Arizona** trout, Salmo apache was the only **salmonid** resident in the Black, **White**, and Little Colorado River drainages. Introduction of other trout species has reduced pure populations to



those existing in isolated headwater areas of the drainages described above. To a lesser extent, brown and brook trout limit S. apache through competitive interaction. Rainbow trout is the major factor limiting the prevalence of S. apache. Hybridization between these two species readily occurs, thereby contaminating pure S. apache populations.



TO MAINTAIN SELF-SUSTAINING POPULATIONS OF ARIZONA TROUT



'PART 11

RECOVERY STEP-DOWN PLAN

Narrative

The ultimate objective of the Arizona Trout Recovery Plan **is** the restoration of Salmo apache to a non-threatened status. Initial conservation efforts of ~~the 1960-1971~~ period have made strides **toward this** goal. To **date**, the species has progressed **from** a depleted, endangered resource to a threatened entity. **Management** efforts for this species should result in its recovery and delisting to non-threatened status. To achieve this goal the recovery team outlines the following actions.

1.0 Establish and/or maintain 30 self-sustaining discrete populations of pure Arizona trout throughout its historic range. When this goal has been achieved, the **species** should be delisted.

1.1 **Survey** and enhance those waters believed to contain pure strains of Salmo apache.

1.11 Survey streams containing Arizona trout periodically—at **least every** three years—to determine that they have not become contaminated with exotic species nor reduced to **dangerously low** levels (near extinction). If **necessary** to determine the genetic purity of these populations, and **if** the population level warrants it, specimens will be collected during these surveys and examined by competent taxonomists.

1.12 Assess and maintain barrier effectiveness. Conduct periodic inspections to determine efficiency of natural and/or artificial barriers. Barrier height, length and permanence are **necessary** considerations. New barrier construction and those in need of repair or replacement **should** receive **immediate** attention.

1.13 Develop **methods** to maintain **and increase** existing populations.

1.131 Prohibit introduction of non-native salmonids into waters presently believed to contain pure Salmo apache populations.

1.132 **Improve** feeding, **spawning and** cover areas within the stream through physical **manipulation** within the stream and encourage the **practice** of sound land **management within the watershed**.

1.2 **Survey** and enhance candidate waters.

(Candidate streams are those trout-type waters **within** the historic range of Salmo apache, generally confined to higher elevations,

that possess natural barriers **or** potential barrier sites that prevent upstream movement **of** fish. These streams need not presently contain Apache trout, but they must be within the historic range.)

- 1.21 **Conduct an intensive fishery survey.**  
Candidate Arizona trout waters will be subject to intensive surveys. Data on the physical, chemical and biological components of the aquatic environment will be collected and evaluated to determine their suitability for salmonids. Stream surveys will cover the entire length of the candidate streams from barrier (site) to source waters.
- 1.22 **Determine** existence of natural barriers and/or sites for artificial barriers, and their effectiveness.  
Effective natural barriers have prevented the complete loss of this species from genetic swamping by introduced salmonids. Candidate waters will be inspected throughout their lengths to determine the presence of natural barriers and/or potential sites for artificial barrier construction.
- 1.23 Determine suitability of candidate streams for Arizona trout. Utilizing data from Sections 1.21 and 1.22, each candidate stream will be evaluated for its suitability for Salmo apache, and those waters found suitable will be renovated and stocked (see 1.24 and 1.25). Unsuitable waters will be eliminated as candidate streams or altered to improve their suitability. Alterations of waters and/or their watershed will be approached on a case-by-case basis.
- 1.24 **Prepare** the candidate stream for Salmo apache.  
Construct artificial barriers if needed. Renovate stream to remove other salmonid species that would hybridize or compete with the Arizona trout. No Arizona trout will be introduced until the success of this portion of the program is verified.
- 1.25 Introduce Arizona trout and reclassify the candidate stream to known stream status. When available, salvage operations will return resident Salmo apache to their original streams after renovation. Introductions into streams where Arizona trout have hybridized or been extirpated will be made with populations from contiguous streams where pure S. apache stock is available. Hatchery stock will be used only when wild stock of close ancestry is not available. Once a successful introduction has been accomplished, the stream will be reclassified as a known Arizona trout stream. Records of each introduction should be carefully maintained by all parties and deposited with Arizona Game and Fish and the U.S. Fish and Wildlife Service.

1.3 Maintain a hatchery brood stock of Arizona trout. This action will serve the threefold purpose of: creating a refugium for this species **in** the event of a cataclysmic occurrence in the species' native range; providing a source **of** fish for expanding its present range **in** historic habitat when conditions are suitable; **and** providing fish for an expanded sport fishery.

1.31 Develop criteria for selection and acquisition of new brood fish. Of primary concern are criteria to prevent total domestication, inbreeding, disease, **hybridization** and maintenance of **genetically** distinct forms.

1.32 Develop guidelines for maintenance of brood fish in hatcheries. **These** should include, but are not limited to, disease work, water quality requirements, dietary requirements and a plan to insure genetic purity. As **fish** die **or** are planted, they should be replaced with wild stock in order to preserve the wild genotype.

1.33 Develop guidelines **for** the disposal of hatchery reared fish. Once the hatchery program gets into full production, fish will be removed on a regular basis. Areas selected **in** this phase of the recovery work should follow the **criteria** outlined under Section 1.2 of this recovery plan. Every effort should be made to insure that these selected habitats lend themselves to self-sustaining populations and are **within** the historic range of **the** species. **Fish** **should** not be stocked into habitats **which** already contain S. apache to insure the preservation of a gene pool which has evolved to meet the unique requirements of their particular habitat.

#### 1.4 Study the ecology **of Arizona trout.**

1.41 Conduct a **review of** all literature pertaining to Arizona trout in order to determine subjects for future study.

1.42 Conduct life history research on **Arizona** trout in those realms where the information **is** not available or is inadequate, such as (a) habitat requirements, (b) competition **and its effects** on population size, (c) **taxonomy of isolated** populations. **Additional** information **is** also needed on reproduction, **growth**, behavior, physiology, temperature tolerances, and genetic **swamping**.

1.43 **Develop** methods of identifying pure populations **of Arizona trout** in the field, **or** by personnel **with** only a limited taxonomic background.

- 1.44 Investigate and promote the suitability of Arizona trout to support sport fishing pressures. Popular support for endangered or threatened species **is** not in itself a means of recovery. However, the **public** demand for Arizona trout as a game fish has already been strongly established and will continue to be a **consideration in** its recovery. Lack of **management information** was one factor that led to its original decline (Figure 3). Recovery of the species will be partially dependent upon the development of valid conservation regulations that allow the species to be harvested on a sustained yield **basis**.
- 2.0 Survey and manage **Arizona** trout populations presently existing in waters outside the historic range. Several waters have been stocked with **S. apache** within the **last 20 years** that are outside the historic range of **this** species (Table 1). The Recovery **Team recommends** these waters be surveyed **to determine population** status of **Arizona** trout. **This** program should not be expanded **beyond** the present waters (**Pinaleno Mountains** and North **Kaibab** Plateau) until such time as **all** waters determined suitable within the historic range have re-established **Arizona** trout **populations**.
  - 2.1 **Survey** existing Arizona trout populations.  
**Narrative** similar to Section **1.11**.
  - 2.2 Determine barrier **effectiveness**.  
**Narrative** similar to Section **1.12**.
  - 2.3 Develop methods to maintain and increase existing populations.  
**Narrative** similar to Section **1.13**.
- 3.0 Provide habitat **protection** through implementation of land management practices, **programs** and **acquisitions**. **Salmo apache** appears to be a relict species, maintaining its **highest density** in pristine habitats. Most land areas today are subject to various perturbations resulting **from** land **management** practices, leaving few pristine areas available to species dependent upon that **type of** habitat. Management techniques **must** be developed for these remaining fragile habitats that will **maintain** and improve **conditions** for **Arizona trout** while accommodating other land uses when feasible.
  - 3.1 Develop and apply **grazing practices** that maintain **Arizona** trout habitat. In the Southwest, livestock grazing has long been a dominant use of the watersheds. Water **is** the key to livestock distribution and forage **use**. **Historically**, watering areas such as **streams**, springs and wetlands have been **degraded** and have **deteriorated** **because of** **mismanagement** or lack of **livestock management in** these fragile areas.

Riparian vegetation in many areas has been eliminated or **extensively** reduced. As a result, these vegetative communities are unable to reproduce successfully, provide shade to ameliorate water temperatures, function as energy sources, or minimize erosion and sedimentation.

Since grazing on public lands (including wildlands) is provided for by law, **it is** an activity that must be coordinated in order to maintain or **improve** stream, riparian and watershed conditions in Arizona trout habitats. Higher elevation sites will respond **positively** and quickly to grazing **systems** designed to restore stream habitat conditions, whereas sites at lower elevations will probably require more severe restraints, such as protective fencing. Planting native shrubs and trees within these riparian sites **will** hasten the vegetative **recovery**, assuming adequate protection **from** livestock can be afforded the new plants.

- 3.2 Develop and apply logging and silvicultural practices that maintain Arizona trout habitat. Timber harvesting activities **primarily** increase **soil** disturbance and increase the possibility of organic and inorganic solids reaching fragile trout habitat. Removal of trees adjacent to stream can lead to increased sedimentation and higher **water** temperatures.

**Intermittent** tributaries frequently provide spawning **sites** and **key** habitat for **fish** which restock the main **perennial** stream. Spring **runoff** usually determines the extent these intermittent tributaries are **used**. Therefore, along the channels of **intermittent** tributaries, buffer zones of undergrowth vegetation should be preserved as filter strips to prevent washing of sediment into perennial **streams**. Soil disturbance **in** these intermittent **tributaries** should be held to a minimum by restricting skidding and road **construction** within the buffer strip.

**Buffer** strips are recommended along all perennial stream that support or have the potential of supporting Arizona trout. Configuration of these strips will vary **with** topography, soil type, adjacent habitat **type** and stream morphology, but generally they should be 100 feet wide (level ground) on each side of the stream, plus 4 feet of buffer width for each 1% increase in slope between the **stream** and the uphill side of the terrain. These vegetational **zones** **will** provide stream shading and filter wind- and water-borne soil moving into the **stream**. Other uses of the buffer **zone** shall **not** be **detrimental to Arizona** trout habitat.

- 3.3 Develop and apply other land use criteria as programs affect **Arizona** trout **habitat**.



Mining: Mining **activities** often produce effluents that are toxic to fish. Each proposed mining operation **within** the **watershed** of an **Arizona** trout population should be critically reviewed. Because of the tremendous variety of potential problems, this will require consideration on a case-by-case basis. The review of each mining operation should include the necessary steps **and** action to prevent any toxic effluent from entering stream occupied by, or that have potential for reintroduction of Arizona trout.

Chemicals: The use of chemicals **within** the watershed of an **Arizona** trout population should receive critical review **and** must include **all** necessary steps to preclude adverse effects. Again, this **review** will have to be made on a case-by-case **basis**.

Instream flow: In order to maintain Arizona trout habitat in **known** and candidate stream, adequate **instream** flow rates must be maintained and assured. If adequate **flows are not** assured, future diversions could reduce or **eliminate** existing trout habitat.

Fire management: Intensive **wildfires** that **consume** extensive areas of vegetation could result in the loss of a major portion of the existing **Arizona trout** habitat.

Fuel reduction in high risk areas should be accomplished by the **pile and burn or prescribed broadcast method**. Fire suppression should receive high priority within Arizona trout watersheds. During **small fire** situations, mechanical disturbance of the stream bed could **inflict greater aquatic and riparian resource damage** than the fire itself. Fire retardants have the potential to adversely affect **water quality**. The results of the application of such retardants should be **considered** before their prescribed use is ordered. As a goal, strive to keep retardants a **minimum** of one-fourth mile **from streams**.

- 3.4 Develop and apply recreation standards as they affect **Arizona** trout habitat. **Most Arizona** trout habitat is located in high, cool climates **which** are **highly** desirable for **recreational use**. The presence of water adds an additional attraction for **recreationists**.

**Dispersed** recreational use should be the goal in **stream** side management **units**. The objective should be to maintain high water quality in these sites, with **recreational use** as secondary importance. Lake habitats should also be **managed** for water quality; **however**, these **situations are somewhat** artificial and increased recreational use at these sites can usually be tolerated **if** facilities are provided.

- 3.5 Develop and apply road construction standards as they affect **Arizona** trout habitat. A full restoration program should provide for herbaceous vegetation to be established in a timely **manner** on

disturbed areas such as roads, skid trails, and landings. All road cut and fill slopes should be revegetated immediately after construction, using such measures as matting, mulching, **fertilizing** and planting. Stabilize all temporary roads by draining, revegetating and closing.

Crossing perennial stream should be discouraged unless there are **no** other feasible alternatives to gaining access to an area. If crossings are necessary, **culverts** and bridges--temporary and permanent--should be designed and constructed to **allow free-** flowing water and not present a barrier to fish movement. Design of the crossing should also minimize construction disturbance.

Dumping waste material from road maintenance and backfill into known or candidate **Arizona** trout waters should not be permitted.

Special measures to prevent accelerated erosion resulting from road **drainage** will be required in most situations. The design and maintenance of such energy dissipators will be a significant step in reducing accelerated soil movement.

**Maintenance** of existing roads and the **closure** of those roads not receiving maintenance will help reduce sedimentation.

The location of mining pits (gravel, rocks, etc.) should be well outside the flood plain to prevent sedimentation of critical stream habitat.

- 3.6 Specific habitat needs, in addition to those already discussed, should be **determined**. Methods of assessing the importance of stream improvement structures, pool-riffle ratios, **artificial** and natural cover, spawning substrate, and the associated riparian community should be developed and improvements implemented when found to be **beneficial** to the species.
- 4.0 Provide adequate enforcement of all Federal, State and Tribal laws and **regulations** to insure protection of **S. apache**. Laws and regulations concerning **harvest**, pollution and protection are adequate for the preservation of **Arizona** trout. The weak links in the enforcement effort are lack of: (1) available manpower; (2) enforcement by law officers, and (3) **criminal** prosecution. **Every** effort should be made to educate officers and courts of the **importance** of enforcing **laws** and regulations which provide **protection** for **Arizona** trout.
- 5.0 Develop public support of the **Arizona** trout program through an **information** and education campaign.

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**PART III - IMPLEMENTATION SCHEDULE**

GENERAL CATEGORY (1)	PLAN TASK (2)	TASK # (3)	PRIORITY # (4)	TASK DURATION (5)	RESPONSIBLE AGENCY			FISCAL YEAR COSTS (EST.)			COMMENTS (9)	
					FWS	OTHER	(8)	FY84	FY85	FY86		
					REGION (6)							PROGRAM (6a)
					(6)	(6a)	(7)	(8)				(9)
M3	Survey, inventory and enhance known Arizona troutwaters.	1.11	1	ongoing	2	SE	USPS AGFD WHAT	2,000	2,000	2,000	nearing completion	
1 1 3	Survey and enhance candidate waters	1.2	2	ongoing	2		USPS WHAT AGFD	2,000	2,000	2,000	Work progressing well	
MI	Maintain hatchery broodstock.	1.3	3	ongoing	2	FR	AGFD	3,500	3,500	4,000		
14	Literature review	1.41	3	2 yrs.	2	SE	AGFD	complete				
R14	Conduct life history research	1.42	2	ongoing	2	SE, FR	AGFD USPS WHAT	10,000	10,000	5,000		
R5	Develop method of determining genetic purity	1.43	1	2 yrs.	2	SE	USPS	10,000	10,000	10,000	partially completed	
M7	Suitability of Arizona trout to support a fishery	1.44	3	3 yrs.	2		AGFD WHAT	complete				
M2	Survey, inventory and manage populations in nonhistoric range.	2.0	3	ongoing	2		AGFD USPS	1,000	1,000	1,000		

## APPENDIX

Letters and Memoranda Commenting on the Draft Plan

PART III - IMPLEMENTATION SCHEDULE

GENERAL CATEGORY	PLAN TASK	TASK #	PRIORITY #	TASK I DURATION	RESPONSIBLE AGENCY			FISCAL YEAR COSTS			COMMENTS
					FWS	OTHER		(EST.)			
					REGION	PROGRAM		FY84	FY85	FY86	
(1)	(2)	(3)	(4)	(5)	(6)	(6a)	(7)	(8)			(9)
M3	Provide habitat protection and maintenance	3.0	2	ongoing	2	SE HR	USPS WMAT	3,000	4,000	4,000	
02	Enforce laws and regulationa	4.0	2	ongoing	2	LE	AGFD WMAT	10,000	10,000	10,000	
01	Information and Education program.	5.0	3	ongoing	2	PAO	AGFD WMAT USFS	1,500	1,500	1,500	

Comments on questions about the Arizona Trout Recovery Plan

- A-1 The entire Budget table has been revised as per these directions. Cost (dollars and man days) are estimated to accomplish objectives if tasks are contracted to outside **firma**.
- A-2 **The** species will be recommended for delisting when 30 self-sustaining populations are established.
- B-1 Paragraph 1.2 (now 1.3) has now been amended in the Budget table to show Tribal participation in the rearing of Salmo apache.
- B-2 We agree the White Mountain Apache Tribe will play an important part in the recovery of Salmo apache. All recovery efforts on the Fort Apache Reservation will be closely coordinated with the Tribe.
- C-1 All work on the Fort Apache Reservation lands will be coordinated with the Tribe.
- c-2 These **comments** have been clarified in the plan; see pages 9-12.
- c-3 **The** Arizona Trout Recovery Plan has been developed to coordinate recovery **efforts** between agencies. On-ground implementation of the **recommendations**, including ~~aaa~~ement of the **actions** under the National Environmental Policy Act, **is** the **responsibility** of the . land **managers**.
- C-4 **1.3-1.337** now refers to **1.4-1.45**; ecological studies. Enough of the basic life history data is now available on this species to initiate recovery actions. **More** data **will** be necessary to accomplish the overall objective of the Plan.
- C-S The problem addressed here is the effects **of overgrazing**, not of grazing per **se**. It is doubtful that ~~'~~-game **animals** alone on the **reservation** (deer, elk) will remove enough of the riparian vegetation to produce these effects. Game animals **and** domestic **live-9 stock may** overgraze a **stream bottom and** in those cases the recommendation has been made to control livestock usage. The decision **to** implement the recommendation will be the land **manager's**. Land **managers will** bear the **costs** for these controls.
- C-6 The Recovery Plan cannot "prohibit" road crossings of Arizona trout streams. It does recommend that such crossings be avoided whenever possible and suggests guidelines when crossings are unavoidable.
- c-7 Livestock **should be** managed in **Arizona** trout habitats for the benefit of the trout.



- C-8 This recommendation has been incorporated into the final Plan.
- C-9 Agree. But regulation of recreation rather than prohibition **is** more likely.
- C-10 Fire retardants are usually applied in high concentrations to local areas. Fertilizers are thinly spread over wide areas. Properly applied, fertilizers will not affect aquatic habitats as do fire retardants. Improperly applied, the results would be similar.
- C-11 In cases where compromise is impoaaible, the Endangered Species Act states that Federal land managers will give threatened **species** precedence.
- C-12 Recovery activities start upon approval of the Recovery Plan.
- D-1 These **recommendations** have been incorporated into the final **Recovery** Plan.
- D-2 The Recovery Plan recognizes populations of Arizonatrout introduced outside their native range simply **as** potential gene pools. No change in listing of these populations is recommended at present as they are **being managed** jointly by Arizona Game and Fish Department and the Forest **Service**. Future reintroductions are recommended only for the historic range of this species.
- D-3 **Item 3.0** identified **some** of the habitat problema Arizona trout **populations** are presently facing. **Because** of the broad **aspect** . of **eon of these problema (grazing, logging, mining)**, **only their** general **nature has** been identified and some **recommendations made** to reduce **or** eliminate them. Site specific **implementation** of these recommendations are left to **organizations** (private, state, Federal) **managing** Arizona trout habitat.
- D-4 This portion of the Recovery Plan **baa** been revised. **The primary** purpose of **a** buffer strip **along a** water-course **is** protection of the stream ecosystem. Other activities within the buffer **strips** should be **considered** through their 'impact on **the threatened Arizona trout**. The Recovery Plan makes **recommendations for** Arizona trout habitat management **that will meet** the present and future needs of of the species. **Implementation** of those recomandationa **is** the prerogative of the land manager.
- D-S At this time it **is impossible** to state **all** of the water quality parameters necessary to support **Arizonatrout**. **However**, these **parameters** are presently being **met**, at least at a **minimum** level, in the **streams** that now support this species. No mining effluent should be allowed to enter **Arizona trout streams** that could degrade the present **water** quality.

- D-6 As in the preceding answers, existing Arizona trout habitats presently support the species. These habitats should be maintained as they are unless the change can be shown to be beneficial to Arizona trout populations. Water rights should be addressed by land managers in areas where additional withdrawals may jeopardize Arizona trout habitats.
- D-7 The recommendations for specific fuel management techniques along Arizona trout **streams** (pile and bum **or** prescribed broadcast) are made to reduce the impact on the threatened species' habitat. Other methods that would accomplish the same goal would **likewise** be acceptable.
- D-8 The recommendation notes a problem and suggests an answer. Other answers that accomplish the same goal would likewise be acceptable.
- D-9 **Agree. This** has been Incorporated Into 3.6.
- E-1 **Detennlaatl**oa of the purity of Arizona trout is an important portion of the reintroduction and hatchery broodstock program (see 1.25 and 1.31). A recent report by the Forest **Service (Rinne, J.N.** 1978. **Dlstrlbutlon** of pure **populations** of the native Arizona trout, **Salmo apache Miller** -- A report to old la the management and recovery **of a threatened** species of fish. Rocky Mountain Forest **and Range Experimental Station, Tempe, Arizona,** 60 pages) Is one portion of that **program.**
- F-1 **This recommendation** hen been **incorporated** Into the final Recovery Plan (1.25). The **State of Arizona has** been documenting all Arizona trout stocking **and will** continue to do **so.** In addition, the **U. S. Fish and Wildlife Service is** entering Section 7 consultation under the Endangered Species Act of 1973 before introducing non-native fish species anywhere into the Colorado **River** basin. Non-native fish species that might jeopardize the threatened species **will** not be introduced into existing Arizona trout waters by the **Fish and Wildlife Service or the State of Arizona.**

Governor  
RAULH. CASTRO

WILLIAM H. BEERS, Prescott, Chairman  
CHARLES F. ROBERTS, O.D., Bisbee  
FRANK FERGUSON, JR., Yuma  
MILTON G. EVANS, Flagstaff  
C. GENE TOLLE, Phoenix

Director  
ROBERT A. JANTZEN

Asst. Director, Operations  
FRED M. COSPER

Asst. Director, Services  
ROGER J. GRUENEWALD

W. O. Nelson, Regional Director-FWS  
P. O. Box 1306  
Albuquerque, NM 87103

## ARIZONA GAME & FISH DEPARTMENT

2222 West Greenway Road Phoenix, Arizona 85023 922-3110

August 11, 1977

Dear Bill:

We have reviewed the draft Arizona Trout Recovery Plan and consider it as a whole to be a job extremely well done. Our sole concern is with page 29 detailing target dates, division of responsibility among the various administrative entities, and breakdown of costs. The information in this table **raises more** questions than it answers.

**(A-1)** To begin with, the table headings need clarification. Presumably "Target Date" means the year when a particular **activity** is or **was** to be initiated. If this is what it means some other designation should be used. Also, are these fiscal or calendar years? Does "year one" mean **Jan. 1-Dec. 31, 1977** or **July 1, 1977-June 30, 1978**?

There **is no clearcut division** of **responsibility** indicated, particularly regarding costs. If **responsibility** is **"State/FWS"**, does it mean **estimated** costs are expected to be evenly **split** between two agencies?

What is the **basis** for the cost estimates? **And** why the **significant difference** in estimated cost **in** some **cases** from year 1 to year 2 to year 3? The first item in this table predicts the need for \$13,500 for the first year. How many **mandays** of work does this represent? **How** much of the \$13,500 is for other than personal services? Why does the **estimated** cost in the second year drop to \$5,000 and then jump to \$35,000 in the third year? We are unable to get a **clue** to such wide variances in costs from the narrative portion of the plan.

**Estimates** of costs for year 4 **are** left as a question for wet items. Presumably this is intended to suggest **the** uncertainty of any need **to continue** the program beyond year 3 or 4. **This** raises an important question that the team should address in this plan: At what **point** will the program be considered a success **allowing** this species to be de-classified to non-threatened status? **How will** we know when **that** happy day has arrived?

I feel that the administrators of this agency must **have** answers to such questions to guide them in decision making.

Sincerely,

Robert A. Jantzen, Director

By: *Steve* Gallizioli, Chief  
Research Division

FWS REG. 2  
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AUG 16 '77

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U. S. F. W. S.

AUG 15 '77

OFFICE OF THE  
DIRECTOR

SG:rb

cc Jim Novy

SE

cc sent to Kevin Ryan, IF, Permit  
Jim Novy, H. L. Leader, Permit



# White Mountain Recreation Enterprise

P. O. BOX 218  
WHITERIVER, ARIZONA

OWNED AND OPERATED BY THE WHITE MOUNTAIN APACHE TRIBE

REGIONAL DIRECTOR

SE R2	
✓	Woody
	Justice
✓	Johnson
	Halvorson
	Sanchez
	Sarg
	ACTION
FILE	

March 28, 1978

R. J. Stephens  
Regional Director  
Fish and Wildlife Service  
P. O. Box 1306  
Albuquerque, New Mexico 87103

Dear Mr. Stephen:

Attached you will find the draft of the Arizona Trout Recovery Plan. After reviewing the plan, the only comments we have are contained on the last page. Activity designator 1.2. maintain hatchery broodstock of Arizona trout. The tribe is in the process of building a hatchery, and is considering maintaining a broodstock to reintroduce into the renovated portions of streams.

Activity designator 1.33 - conduct research on Arizona trout. The tribe will be the contact for research conducted on tribal lands.

Designator 5.0 develop public support through I & E programs. The tribe will have to be a cooperator on this also. This program will be necessary to gain tribal member support of the programs needed for stream renovations, etc.

Thank you for the opportunity to comment on this important project.

Sincerely,

Phillip R. Stago, Jr., Director  
White Mountain Recreation Enterprise  
WHITE MOUNTAIN APACHE TRIBE

Attachment

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APR 4 '78

SE



United States Department of the Interior  
BUREAU OF INDIAN AFFAIRS  
FORT APACHE AGENCY  
Whiteriver, Arizona 85941  
(602) 338-4364 Ext. 232

RD  
DPO  
ACTION  
MAR 15 1978

Mr. W.O. Nelson Jr.  
Regional Director, Region 2  
Fish and Wildlife Service  
P.O. Box 1306  
Albuquerque, New Mexico 87103

Dear Mr. Nelson:

Comments on the proposed Arizona Trout Recovery Plan are as follows:

C-1

We suggest that before completing and implementing the plan that all investigations and studies be completed and approval obtained from the Tribal Council after they have been fully informed as to how the proposed actions would affect all their resources and their use and development in the future. This would include timber, grazing, all types of outdoor recreation, wildlife and other fish species and land and/or water uses such as irrigation, industrial, roads and homesites.

Following are more detailed staff comments:

Page

17. 1.0

C-2

"native range" - define (historical distribution or present known distribution?) . Earlier statements indicate uncertainty as to historical distribution and to a lesser extent as to present distribution (in an unhybridized state). The question comes to mind as to the feasibility of attempting to establish and/or maintain populations in all waters probably once occupied by the pure strain of Salmo apache.

18. 1.121

C-3

"In addition", detailed evaluations... existing stats. Who will be involved in evaluating land use patterns and determining stream and watershed improvement measures to "be considered and initiated for habitat determined to be unsuitable for re-introduction in its existing state"? Will this survey include a comprehensive study including, alternatives for the long term best interests of the Apache tribe and the costs of proposed actions and measures on each of the waters?



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MAR 17 1978

OFFICE OF THE  
REGIONAL DIRECTOR

1.3-1337 Should not more answers to questions posed in these study areas be acquired before proposing LO? ,

3.0 "while accomodating other land uses when feasible".  
The tribal council should determine feasibility on tribal lands after a thorough study of costs, benefits, etc. of any proposed decisions and actions.

### 3.1 Grazing Standards

Much of the existing remote habitat of the trout on the reservation is located in the spruce-fir or upper mixed conifer types. The only realistic livestock carrying capacity in much of these types is within or closely adjacent to the riparian vegetation. It is possible that the only sure grazing standard to protect the fish habitat would be exclusion of domestic livestock. Would such standards also be applied to wildlife (elk) and wild horses?

How low (Lower elevations) and to what extent "throughout its native range" would consideration be given to habitat control? This might cause considerable conflict with livestock interests not only in regards to forage utilization but also livestock movement and hauling procedures.

Who would bear the cost of fencing, construction and maintenance?

- 3.2 What of road crossing of streams - will they be prohibited? If buffer zones "shall be managed only for stream enhancement". Does this mean domestic livestock will be excluded or livestock management a secondary consideration?
- 3.3 The resource damage mentioned in paragraph 5 refers to the aquatic resource and not the timber resource.
- 3.4 "increased recreational use" in remote areas will impact primarily on the riparian habitat and toleration may not be as liberal as implied. Facilities will also be a two edged sword in such areas. Recreation use may also have to be prohibited to maintain the habitat.
- 3.6 Effect of fertilization on habitat? If concerned about fire retardants effect on water quality (sec. 3.3) why not fertilizers in this section. Both are being used in an attempt to minimize soil movement by vegetation stabilization on critical slopes (one to maintain the other to restore).

C-11

Maintenance on soil surface roads may contribute more potential sediment than no maintenance. (as most people consider maintenance as grading the roads) also may damage the reestablished vegetation. Roads in fact should not be permitted at all in critical areas as revegetation and soil movement may be very speculative for a number of years. And very costly if prepared attempts have to be made. It may not be possible to compromise. It will be fish or timber on many areas.

We trust that all barrier work will receive the same concerns as other activities in the area.

What is the target date for start of activity?

Sincerely yours,

  
Superintendent

(F)

26  
May

RD \_\_\_\_\_  
DRD \_\_\_\_\_  
ARL \_\_\_\_\_  
ARL \_\_\_\_\_  
AEV \_\_\_\_\_  
CSS \_\_\_\_\_  
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ACTION \_\_\_\_\_  
LIT \_\_\_\_\_

We have reviewed the draft recovery plan for the Arizona Trout, Salmo apache, dated **July 25, 1977**. The plan represents a good **beginning**, but we have several questions we would like to **resolve** before we endorse the plan.

**D-1**

D-2

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Several examples follow from the plan:

D-4

3.2 Buffer Zones. It is a standard practice to use buffer zones to coordinate logging activities with the fishery resource needs. The statement that "buffer zones shall be managed only for stream enhancement" is inappropriate for the plan. This land use allocation is the prerogative of the land manager.

D-5

3.3 Mining. The plan should state the necessary water quality standards needed for the Arizona Trout. The land managing agency will deal with mining effluents.

D-6

**Instream Flow.** If stream diversions are damaging Arizona Trout populations, the plan should identify these. Otherwise, the **comment** is too broad and serves no real purpose in such a complex issue as water rights.

D-7

**Fire Management.** The plan notes the need for fuel management for habitat protection, but it is **inappropriate** to specify a particular fuel reduction method. Many factors relate to the selection of the proper **treatment** method.

D-8


3.4 Allocations of Recreation Use. Again the **comments** are a proper subject for the managing agency. The plan should not specify land use allocations.

D-9

**3.5 Stream Improvement Structures.** The installation of stream **improvement** structures may not be appropriate to all streams. The plan should address the pool-riffle ratio that is desirable for Arizona Trout. If specific streams would benefit from such structures, these could be noted.

We apologize for the lateness of our review, and hope our **comments** will be helpful in getting an effective plan completed. We will be happy to discuss our **comments** with you.

Sincerely,

  
GARY E. CARGILL  
Deputy Regional Forester  
Resources

THE UNIVERSITY OF MICHIGAN

ANN ARBOR, MICHIGAN, U.S.A. 48109

MUSEUM OF ZOOLOGY

November 30, 1977

Dr. James E. Johnson  
Endangered Species Biologist  
Fish and Wildlife Service  
P.O. Box 1306  
Albuquerque, New Mexico 87103

Dear Jim:

Enclosed is the Arizona Trout Recovery Plan with my annotations.

The drawing does not do justice to this **handsome** species. If it would help, I would be happy to send a photo of the holotype to aid in redoing the illustration.

My chief worry about the recovery work on Salmo apache arose at the Grand Junction DFC meeting when a color slide (said to be this species) was shown for the Christmas Tree **Lake** population. It was clearly a hybrid although I understand (letter from Rlnne dated 9 Dec. 1976) that the **Christmas** Tree Lake stock is considered as one of the "pure" **populations** of Arizona trout by the Recovery Team.

The importance of accurate determination of pure stock of S. apache cannot be overemphasized; if individuals containing rainbow genes are used for reestablishment of the species the primary purpose of the recovery plan **will** be defeated.

**It** is a shame that the original Ord Creek stock reared at the Sterling Springs Hatchery in Oak Creek Canyon (from which the karyotype of S. apache **was** determined) was "lost". When I was there in 1964 the stock was in excellent condition under the watchful eye of Minnie McFarland.

Whether the Recovery Team is taking adequate steps to assure that hybridized stock is not being **utilized** for stocking or reestablishment I cannot determine for certain from the present draft.

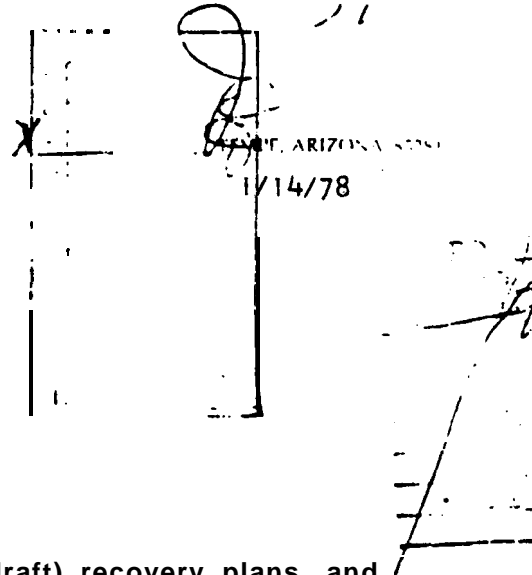
Sincerely,



Robert R. Miller  
Curator of Fishes

Enc.  
RRM:kmw

ARIZONA STATE  
UNIVERSITY  
DEPARTMENT OF ZOOLOGY



W. O. Nelson  
Regional Director  
U. S. Department of Interior  
Fish and Wildlife Service  
P.O. Box 1306  
Albuquerque, New Mexico 87103

Dear Mr. Nelson

I have reviewed both the Gila and Apache trout (draft) recovery plans, and commented directly on the copies that I was supplied--they are enclosed.

I am especially impressed with the plan for S. gilae superior to any other recovery plan I have had the opportunity to examine, including a few for terrestrial vertebrates. The writing is concise and professional, the proposals are brief and obviously well thought out, and format is exceptionally well organized. The team is to be highly commended for this piece of work!!!

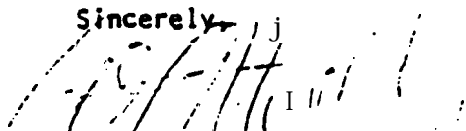
Especially important, and something that should be incorporated into the plan for S. apache, is the emphasis on careful evaluation of sport fishing potentials, impacts, and so on for S. gilae. Such a section was available for the Colorado River squawfish we would not now see such a problem in its re-establishment in the lower Colorado River basin.

(F-1) With reference to the plan for S. apache, I strongly recommend a major and formalized statement relative to the necessity for documentation of all stockings of that species, and of S. gairdneri within the range of the native. This has yet to be done, in detail, and certainly can be accomplished by determined effort and search of all stocking records available from federal, state, and perhaps private (Apache Tribal records?) sources. Until we have documentation, we must work backwards from extant specimens and through the horrors of variation found in populations of trouts from the White Mountain area.

Again, many of my comments are editorial in nature, and should be taken as such.

Thank you for the opportunity to review these plans in draft form. If there are problems in reading some of my comments (in my scrawl), please contact me.

Sincerely,

  
W. L. Minckley  
Professor of Zoology

FWS P.O. 2  
7

1978

CE